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The 100 largest companies in the Czech Republic and Poland in the year 2010: a comparative study of economic performance

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Abstract

The main purpose of this paper is to compare the 100 largest Czech and Polish companies on the basis of selected measures of economic effectiveness and also with regard to other characteristics of their activities such as export activities and rationality of employment. A division of the examined group was introduced and included some companies which concentrate on production activity (Group P) and others whose activity focuses on trading and service (Group TS). A chi-square test of independence, a z-test and cluster analysis were used. The structure of the 100 largest companies, in regard to the application of the criterion of division into P and TS, was not significantly different. The Czech Group P enterprises seem to be, on average, slightly better managed than their Polish counterparts. The classification (cluster analysis) allowed the separation of six groups of companies into different characteristics.

Keywords

Economic effectiveness, export activities, productivity, top-100 enterprises.

JELClassification: L2, L6, L8, P52

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1. Introduction

The largest enterprises are objects of interest not only because of the scale of their activity, but also because they create a peculiar *visiting card* of economies in states in which they function. They are a manifestation of the competitive advantages of their societies (Jarvinen et al., 2009). They are either managed in a modern and rational manner or require restructuring, which most often reflects the condition of the economy as a whole. In the process of attaining high levels of effectiveness in transforming and developing economies, an important role is played by foreign investments and privatization (Geršl, 2008; Szymanski et al., 2007; Ecevit et al., 2010; Kolasa et al., 2010).

The aim of this paper is to draw a comparison between the 100 largest Czech and Polish companies companies on the basis of selected measures of economic effectiveness and also such other characteristics of their activity as export activity and rationality of employment. The authors concentrated on grasping possible differences and similarities, as well as the causes behind them in the group of *flagship* companies of the economies of two countries which are neighbours in Central Europe.

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During the past decade, the Czech Republic and Poland have undergone significant political, economic and geopolitical changes (Klich and Poznańska, 2005; Kislingerová and Nový, 2005; Sedláček, 2007; Kołodko and Tomkiewicz, 2009; Kołodko, 2011; Kowalski 2009; Strouhal et al., 2009; Gočev, 2010; Klusáček et al., 2005; Brůha et al., 2010; Pazour et al., 2010). A comparative study of the economic performance between the Czech and the Polish largest companies would be interesting. The authors believe that there is a need for such comparative studies.

For the purposes of the analysis, our ranking includes companies in the Czech Republic and Poland. The Top 100 rankings are based on company revenues. Revenues and financial net result have been calculated in Euros at the relevant average exchange rates.

The structure of this paper is as follows: the first section presents the aims and a review of literature. In the second section, the data and methodology are identified for the empirical work. In Section Three, we discuss the structure of activity of the 100 largest companies in Poland and the Czech Republic. Section Four discusses the issue of economic effectiveness. Exports activity and management in the sphere of employment are examined in the fifth section. Section Six discusses the results and contains conclusions.

2. Data and methods

The sample includes 100 companies per country. On the basis of available data about the 100 largest enterprises[1] in the Czech Republic and Poland (*Lista 500*, *Największe firmy Rzeczpospolitej, 2011*; *Top-100*, *2011*), as regards the value of their sales in 2010, a comparative study was conducted, taking into account selected variables relating to economic effectiveness and other characteristics of business activity such as export activity and rationality of employment. A division of the group being examined was introduced into companies which concentrate on production activity (Group P) and those whose activity focuses on trading and service (Group TS). The data from all kinds of activity was presented in accordance with Classification of Economic Activities (CZ-NACE) for Czech entities, and the Polish Classification of Activity (PKD 2007) for Polish entities.

Descriptive statistics are used to describe the basic features of the data in the study. Together with simple graphics analysis, they provide simple summaries of the samples and the measures. The examination of the structure of business activity on the basis of the adopted divisive criterion concerning the top-100 in the Czech Republic and in Poland is carried out by means of a chi-square test of independence. The z-test is used to check the significance of mean differences for such variables as: sales revenues, financial net result, ROS (return on sales), share of export in sales and also employment and productivity of employment. In the paper, two of the most popular clustering techniques are presented in the framework of the data recovery approach (Ward method for hierarchical clustering and k-means for partitioning).

The examination of the structure of economic activity on the basis of the introduced criterion of division in the top-100 group in the Czech Republic and in Poland is conducted with the use of a chi-square test of independence (Mansfield, 1987; Ostasiewicz et al., 1997). There are two variables. One variable has r levels, the other variable has s levels. There are $r \cdot s$ observed frequencies (contingency table).

Null hypothesis

H_0: Variable A and variable B are independent.

An alternative hypothesis

H_1: Variable A and variable B are not independent.

The test statistic is

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{s}\frac{(n_{ij}-\hat{n}_{ij})^2}{\hat{n}_{ij}},$$

where χ^2 is the chi-square statistic, the (i, j)-th cell in the contingency table refers to the i-th row and j-th column in it, n_{ij} is observed frequency in the i-th row and the j-th column, $\hat{n}_{ij}$ is expected (theoretical) frequency in the i-th row and the j-th column, r is number of rows, and $s$is number of columns.

The z-test is used to test the significance of the difference between two sample means (Mansfield, 1987; Ostasiewicz et al., 1997). We recommend the use of z-test data analysis tool, because sample sizes are large. We recommend the use of z-test data analysis tool, because all sample sizes are large. The most basic theorem of the statistics, the Central Limit Theorem, requires large sample sizes in order to plot sample averages on a Normal curve, regardless of the underlying population distribution. Requirements: two independent populations, σ_1 and σ_2 are known, large samples.

Null hypothesis

H_0: $\mu_1 - \mu_2 = 0$.

An alternative hypothesis

H_1: $\mu_1 - \mu_2 < 0$.

The test statistic is

[1]Without financial and insurance activities.

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}},$$

where $\bar{x}_1$ and $\bar{x}_2$ are the means of the two samples, σ_1 and σ_2 are the standard deviations of the two populations ($\sigma_1 \approx s_1$ and $\sigma_2 \approx s_2$ when s_1 and s_2 are the standard deviations of the two samples) and n_1 and n_2 are the sizes of the two samples.

If the significance level α (maximum probability of rejecting the null hypothesis when – in fact – it is true) were established as 0.05, then definitely the p-value (probability of observing the observed test statistic value at least as unfavorable to the null hypothesis) being less than 0.05 would lead to the rejection of the null hypothesis.

The cluster analysis is an exploratory data analysis tool which aims at sorting different objects into groups so that that the degree of association between two objects is maximal if they belong to the same group and minimal otherwise. The term cluster analysis encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories. A general question facing researchers in many areas of inquiry is how to organize observed data into structures; that is, to develop taxonomies.

The Ward method is distinct from all other methods because it uses an analysis of variance approach to evaluate the distances between clusters. In short, this method attempts to minimize the Sum of Squares of any two (hypothetical) clusters that can be formed at each step. In general, this method is regarded as very efficient. However, it tends to create clusters of a small size. In *k*-means clustering, *STATISTICA* tries to move objects in and out of groups (clusters) to achieve the most significant results. The magnitude of the *F* values from the analysis of variance performed on each dimension is another indication of how well the respective dimensions discriminate between clusters. It should be mentioned that the best number of k clusters leading to the greatest separation (distance) is not known apriori and must be computed from the data.

3. The structure of activity of the 100 largest companies in the Czech Republic and Poland

Based on juxtapositions of the top-100 largest Polish and Czech enterprises in terms of obtained revenues, a division was introduced into companies whose activity is of a typical production character and the ones that concentrate on trading activity (Tables 12–15). All of the analyzed companies belong to the group of large enterprises. Their activity is – as a consequence – varied both as regards the subjective side of the activity and the territorial one. Obviously, one should not expect the enterprises included in Group P (production companies) not to possess areas of activity of the typically trading nature and, on the other hand, those qualified as Group TS (trading and services) not to realize production activity at all. The concern here is rather with the proportions and accents of the activity. In the first case, the production activity is primary in some measure and is carried out to a broad extent. In the other case, the production activity is complementary in relation to trading. Apart from this, companies that provide services were also included in the other group, as introducing the third independent group of service-rendering firms would be impossible due to their poor representation. Consequently, it was decided to include them in that comprising trading enterprises in compliance with the tendency that in post-industrial economies firms of the typically production type are replaced by ones exploiting exchange of information, financial engineering, innovations, services (Tanabe and Watanabe, 2005).

In order to compare the structures of both economies seen through the prism of 100 of their largest enterprises, as well as relying on the above-introduced division, the hypothesis that, irrespective of the country (Poland or the Czech Republic), the structure of the activity of the 100 largest firms – from the point of view of the criterion *P* or *TS* – is alike, was examined with the use of a chi-square test of independence (Table 1).

Table 1 Contingency table for test of independence

Group \ Country	Poland	Czech
P	38	49
TS	62	51

As regards the group of large enterprises, the Polish economy presents a more uneven structure in comparison with their Czech counterparts. This is expressed through the advantage of the share of trading and services-rendering firms in proportion to the production ones. As regards the Czech economy, on the other hand, we come to deal with a balance in this respect. In the authors' opinion, however, one should not suppose that this *dominance* of firms in Group P over those in Group TS in Poland finds its justification in a more post-industrial structure of the market. It should rather be expected that the much larger internal sales market in Poland creates chances for the appearance of large companies dealing in trading and services. The observed level of test significance amounted to $p = 0.12$, that is greater than the assumed level of $\alpha = 0.05$. Therefore, there is no reason to conclude that the structures of both econo-

mies seen through the prism of their top-100 companies are different, having taken into account the division of the population into the groups of P and TS.

4. The economic effectiveness of the 100 largest companies in the Czech Republic and in Poland

The measures of effectiveness available for the examination included sales revenues, the net financial result (which comprises the result of operating activity, the result of financial operations, the result of extraordinary operations and obligatory encumbrances on financial result due to corporate income tax and equivalent payments, pursuant to separate provisions of law), the *Return on Sales Ratio* (ROS) and the *Return on Assets Ratio* (ROA). In order to obtain clarity of comparison, it was decided to render these values into Euros. In Tables 5–6 the basic descriptive statistics for sales revenues and net financial results are presented.

Within the scope of sales revenues in Group TS, on the basis of a z-test, it can be seen that the mean values of this measure are higher in the group of Polish companies than in the Czech ones ($p = P(Z \le z) = 5.8 \cdot 10^{-8}$, at $\alpha = 0.05$). It is then not only the numerousness of this group that is higher. It also generates higher revenues than the average. Therefore, it can be said that a factor exists which causes large enterprises of Group TS in Poland to function in a more favourable way due to the size of the realized sales. Perhaps this could be said to represent the above-mentioned size of the interior market. Table 5 also displays a greater range of changeability of sales revenues for the Polish top-100.

In the case of Group P, both for Poland and the Czech Republic, the value of statistic z for the variable of sales revenues amounted to (–1.55), whereas probability $p = P(Z \le z) = 0.06$. It can thus be concluded that on the significance level of $\alpha = 0.05$ there are no foundations to reject the hypothesis that mean sales revenues in the case of Group P in Poland and in the Czech Republic equal each other. Accepting the significance level of $\alpha = 0.10$ results, it can be acknowledged that the mean sales revenues in the case of Group P in Poland and in the Czech Republic differ from each other in a significant way[2]. It can also be stated that in Group P, Polish companies realize, on average, greater revenues than the Czech ones. Irrespective of the interpretation, the difference is not, however, so distinctive as in Group TS.

Despite the differences observed in Table 6 containing the basic descriptive statistics related to the mean value of the net financial result in Group P, as well as TS in Poland and in the Czech Republic, they are not statistically significant.

As regards returns on sales (ROS) we do not observe any fundamental differences between the Polish and Czech Groups P or the Polish and Czech Groups TS (Table 7). The tests proved insignificant at the following results: for Group P ($z = (-0.20)$, $p = P(Z \le z) = 0.42$), and for Group TS ($z = (-0.02)$, $p = P(Z \le z) = 0.49$). Thus, there is no basis to reject the null hypothesis on equality of ROS in Groups P and TS in Poland and in the Czech Republic. However, it is worth noticing that the values of ROS for Czech P companies are visibly higher.

In the research practice, during talks held with the management personnel of the enterprises, the thesis is often repeated that the nearer one approaches the end of the chain of value in a given branch, the higher the values of the realized margin. To simplify this a little, trade – according to this thesis – should be more effective by its nature than production. Tests of differences in mean return on sales (Groups P and TS from the Czech Republic and Poland were juxtaposed) turned out to be significant. But surprisingly, the mean value of ROS for Group P in both countries is higher than for Group TS. What is more, it seems to be a more understandable situation because higher profits from trade corporations can be gained through applying pressure only in the case of small and dependent manufacturing companies. In the case of large manufacturing companies, such pressure cannot be exerted. Higher profits are probably realized in Group P because their advantage is based on competencies (a more complicated mix of tough to imitate competencies – technical, logistic, service and so on). This seems to be a more natural situation – a more complicated mix of competencies means higher profits. The tests proved significant at the following results: for the Polish Group P and TS $p = P(Z \le z) = 0.009$, and for the Czech Group P and TS $p = P(Z \le z) = 0.0002$. Also the net financial result is higher for Group P in the Czech Republic, than for Group TS (but $p = P(Z \le z) = 0.08$). It can be thus concluded that on the significance level of $\alpha = 0.05$ there are no foundations to reject the hypothesis that the mean net financial result in the case of Group P and for Group TS in the Czech Republic equal each other. If one accepts the significance level of $\alpha = 0.10$ this implies that one

[2] Failure to reject the null hypothesis is not a *proof* of its validity but may rather be an indication that there is insufficient evidence to dispute it. The acceptance of the alternative hypothesis in contrast to failing to reject the null hypothesis is a positive result in that it supports the conjecture of interests.

needs to acknowledge that the mean net financial result is significantly higher in the case of Group P in the Czech Republic than for Group TS.

As regards the Return on Assets Ratio (ROA, Table 8) tests proved significant only for Polish and Czech Groups P with $p = P(Z \le z) = 0.01$. The ROA reflects in general the rationality of investing in assets needed to act in a given domain (Sierpińska and Jachna, 1994; Tyran, 2005). Thus, we can presume that the assets of the Czech enterprises which compose group P are more productive, maybe also more modern and are adjusted to the current competition. This situation may also be connected with the greater openness of Czech manufacturing companies in view of foreign sales, as we describe in next paragraph.

5. Selected characteristics of the 100 largest companies in the Czech Republic and in Poland

The available data allowed for analyzing such characteristics of the examined companies as exports activity and management in the sphere of employment. Tables 9–10present descriptive statistics of the share of exports in sales revenues and employment.

An important and interesting characteristic of the enterprises being examined is their activity in the scope of exports. The share of foreign sales is significantly higher for Czech manufacturing companies ($p = P(Z \le z) = 0.08$) (by a significance level of $\alpha = 0.1$). This seems to be related to the fact that Czech manufacturing companies are, slightly more often than in Poland, subsidiaries of large international companies (*Skoda*, *Siemens*, *Bosch*, *Toyota*, *Peugeot*, *Citroen*), which forces management to introduce up-to-date management systems and improved technology and stimulates cost control. This may be the main reason for the observed difference in ROA and even the ROS mean level between the Polish and Czech Group P (see previous paragraph). The Czech Group P seems to be more modern than Group P in Poland. For Groups TS from Poland and the Czech Republic z-test did not prove to be significant ($z = (-0.23)$, $p = P(Z \le z) = 0.41$). It is simply less possible to export services to a greater extent. Therefore, trade and sales companies mainly try to be present in the internal market.

As far as the question of employment is concerned, the Polish companies both included in Group P and Group TS are generally larger. The changeability in their employment is also greater. This observation can also be confirmed by *z*-test, both for Group P and Group TS. In the case of the former, the value of statistic z for the employment variable for Group P amounted to (–2.59), whereas the probability was $p = P(Z \le z) = 0.005$. With reference to Group TS, analogous results amounted to the following: $z = (-1.57)$, while $p = P(Z \le z) = 0.06$.

The level of employment itself does not, however, carry information about the effectiveness of its usage; nor does it provide information about the effectiveness of management. Therefore, it was decided that the productivity of employment should be approximated by referring it to the value of the realized sales given in the Euro. The medial values of productivity were calculated on the basis of cases provided by the enterprises for which both data were supplied. The obtained information should be treated with caution, since part of the companies did not make the data on employment available. Generally, the Czech enterprises display a higher mean value of employment productivity than the Polish ones for Group P. One worker employed in a Czech company of the top-100 generates about Euro 1,070 thousand revenue annually, while the value generated by one person employed in a Polish enterprise in Group P amounts to Euro 325 thousand. In Group TS, higher employment productivity can be observed in the case of the Polish companies. Answering the question about whether the other companies are managed in a similar manner, as in the Czech Republic, would require conducting further research. The mean values of productivity in division into companies from both countries and the distinguished groups (P and TS) are presented in Table 11. It needs to be added that employment productivity did not prove significantly different while comparing the Polish and Czech Groups P or TS. For Group P $p = P(Z \le z) = 0.22$, and for Group TS $p = P(Z \le z) = 0.49$.

6. Cluster analysis

One of the biggest problems with cluster analysis is identifying the optimum number of clusters. Because we usually do not know the number of groups or clusters that will emerge in our sample and because we want an optimum solution, a two-stage sequence of analysis will occur as follows:

- We will carry out a hierarchical cluster analysis using the Ward method. This helps to determine the optimum number of clusters we should work with.
- The next stage will be to rerun the hierarchical cluster analysis with our selected number of clusters, which enables us to allocate every case in our sample to a particular cluster.

This sequence and methodology using *STATISTICA* is used in analyzing the following variables: ROS, ROA and productivity. The research will be carried out into

133 entities: 78 entities in Czech and 55 entities in Poland.

Deciding upon the optimum number of clusters is largely subjective, although looking at a dendrogram (see Figure 1) may help. An analysis is run and five major clusters stand out on the dendrogram. This is then quantified using a k-means cluster analysis with six clusters, which reveals that the means of different measures do indeed produce the six clusters.

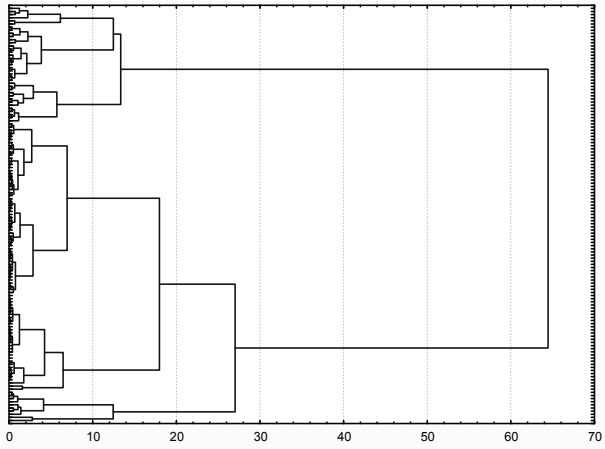

Figure1 Dendrogram using Ward method (distances)

Table 2 outlines the *F*-statistics for each variable. Results indicate that all variables in the procedure were statistically significant at $p < 0.05$.

Table 2 F-statistics for three variables

Specification	*F*	*p*-value
ROS	56.4	0.000*
ROA	118.9	0.000*
Productivity	71.6	0.000*

* significant at the 5% level

Table 3 outlines cluster membership based on the *k*-means clustering solution. Clusters II and VI include enterprises of the best economic standing of all those being analyzed. Ratios ROA, ROS, as well as the productivity of employment are at a high level. Also, good economic standing characterizes companies of Cluster III. The companies of Clusters I, IV and V are the weakest as they operate on very low, close to zero, values of ROS, and low values of ROA.

Cluster I seems to be relatively weak in terms of economic effectiveness. It is composed of 3 Czech and 3 Polish enterprises. Sales revenue and employment figures indicate the extent of activities, allowing for classifying this cluster as being composed of comparatively smaller enterprises. Cluster I is strange, among the others, because the low values of ROA and ROS correspond here to very low employment and – in effect – very high productivity of employment. This is not typically representative of the top-100 companies. We need to deal here either with companies that are very conveniently located within the value chain, are small in terms of employment, or intermediary companies from Group TS that are weak in view of economic effectiveness compared to manufacturing companies like *RWE Transgas, a.s.* and *ALPIQ ENERGY SE*. Due to slightly unclear characteristics, it is difficult to recommend restructuring actions for this group of companies.

Table 3 Statistics (mean values) for free variables for clusters I–VI

Specification	ROS (%)	ROA (%)	Productivity (thousands of Euro)	Number of companies
Cluster I	–0.6	0.5	25,412	6
Cluster II	10.3	19.6	1,018	20
Cluster III	6.1	6.7	921	45
Cluster IV	0.9	1.3	760	50
Cluster V	–2.0	–2.1	26	2
Cluster VI	29.1	16.8	228	10

The second cluster is composed of 8 Polish and 12 Czech enterprises. It includes enterprises of the best economic standing (a high level of ROA, ROS, as well as the productivity of employment). It is impossible to find the common denominator in view of the branches represented here. Among enterprises we name: *Makro Cash & Carry ČR*, *Siemens Group ČR*, *Philips Lighting Poland*, *Totalizator Sportowy*, *Węglokoks*, *Polkomtel*. As regards this group, one can mainly recommend monitoring the competitive situation in order to grasp early signals of changes of business models and configurations of their own strategic groups (direct competitors), which could undermine the strong position of the companies.

The third cluster is composed of 23 Polish and 22 Czech enterprises. These are rather large enterprises which are well-known on the international market. They include: *Skoda*, *Bosch*, *Iveco*, *Saint-Gobain*, *Strabag*, *Skanska*, *Fiat*, *Michelin* and others. As in almost every other cluster, it is impossible to find the common denominator as regards the branches represented here. Management-related actions in this group will depend to a great extent on the policies of central headquarters localized abroad. It is hard then to suggest actions other than traditional concern for operating activity and the most significant measures of effectiveness.

Cluster IV seems to be relatively weak in terms of economic effectiveness. Only a few of them are internationally well-known (*Samsung*, *Electrolux*, *Fiat*, *LG*, *Arcellor Mittal*). Many of the companies in Cluster IV are known for their need for vital restructuring processes (*České dráhy*, *ČD Cargo*, *Polskie*

Linie Lotnicze LOT SA, *Katowicki Holding Węglowy SA GK* and others). With respect to low values of profitability, the boards of these companies need to pay particular attention to the management of operating costs and fixed assets as well as working capital, inventories and receivables. The low values of profitability may give rise to problems as regards a rise in the value of equity. Stronger interest should be recommended in optimizing free cash flows, which result in higher values of residual profit and EVA (*Economic Value Added*).

Cluster V is composed of two enterprises. They are known for a vital need for restructuring processes (*Správa železniční dopravní cesty, státní organizace*, *PKP*, *Polskie Linie Kolejowe SA*). Their management system leaves a lot to be desired. As a result of traditional focus on problems of the inside of the organization and closing to relations with its market environment, PKP (Polish State Railways) has recently lost the opportunity for making use of the EU-granted means for restructuring the quota Euro 1.8 billion. There is an urgent need for restructuring the management systems of companies within this group with respect to clients' requirements, as well as modern conditions of competition. Strategic management in such large enterprises should find its due place in the end.

The relatively small Cluster VI (10 companies) displays high values of ROS, ROA, but a low value of productivity of employment. It is composed of enterprises which in many cases represent traditional, material and industrial branches (*KGHM Polska Miedź SA*, *Severočeské doly a.s.*, *Sokolovská uhelná*, *Lesy České republiky*). Their economic condition seems to be stable, but high employment indicates low productiveness. Cluster VI is composed of 9 Czech and 1 Polish enterprises. It displays prevalence of manufacturing companies. Three companies in Cluster IV belong to the mining and quarrying sector. Regarding the traditional character of enterprises included in this group, attention should be paid in them in terms of human resources management, and – especially – to the fixed, traditional nature of work positions and specialization (work distribution). It is necessary to analyze the procedures of carrying out jobs with respect to optimization (e.g., taking into account possibilities that offer as a result of IT technologies), as well as those work positions which depend on specific tasks being performed.

Table 4 presents the characteristics and recommended actions for clusters I–VI. The authors are planning to conduct further research into the largest companies in both countries in the following years. This should cover the present and prospective group of the 100 largest enterprises, along with an explanation of why the places in the ranking are changing. It is intended to cover stronger liaisons between observed economic effectiveness and the most crucial decisions within companies and changes in their business situations. It is also important to grasp certain typical developmental trajectories that may lead to weakening the economic results of large companies.

7. Conclusions

The aim of this paper was to make a comparison between the Czech and the Polish 100 largest companies on the basis of selected measures of economic effectiveness and also such other characteristics of their activity. On the basis of available data on 100 largest enterprises in the Czech Republic and in Poland, as regards the value of their sales in 2010, and a comparative study was conducted.

In order to grasp eventual similarities and differences within the 100 largest companies in the Czech Republic and in Poland, a criterion was selected

Table 4 The characteristics and recommended actions for clusters I–VI

Specification	Brief characteristics	Recommended actions
Cluster I	Mainly companies in the sector of electric power generation, transmission and distribution, the weakest in view of economic effectiveness	-
Cluster II	Good economic effectiveness	Constant monitoring of the competitive situation and business models
Cluster III	Many companies well-known on international markets, mainly traditional branches represented, high economic effectiveness	Constant care of operating activity and the most significant measures of effectiveness
Cluster IV	High employment, the weakest as regards economic effectiveness	Optimizing management of operating costs, fixed assets and working capital. Paying attention to cash flows
Cluster V	The weakest cluster in terms of economic effectiveness, companies demanding restructuring	Restructuring management systems as regards clients' needs and new conditions of competition. Opening to relations with environment, strategic management
Cluster VI	Mainly traditional branches represented, very good economic effectiveness	Optimizing employment and paying attention to HR function

requiring a division of the research sample into companies that are concentrated to a greater extent on trading and rendering services (Group TS) or production activity (Group P). It proved possible to effectively differentiate between the enterprises being examined. This could not be carried out on the basis of the criteria of product or territorial diversification (essentially all firms are to some degree diversified). On the basis of this division, analyses were carried out which showed certain similarities and differences, and their probable causes were indicated.

With regard to rough data on sales revenues, the net financial results show that their values are higher in the case of the Polish Group P enterprises than those of the Czech Group P, but ratios like ROS, ROA and also share of foreign sales, which indicate rationality of management are higher (significantly or not) for the Czech enterprises. The main reason seems to be related to the fact that Czech manufacturing companies are more often than in Poland subsidiaries of large international companies (Skoda, Siemens, Bosch, Toyota, Peugeot Citroen), which forces the managements to introduce up-to-date management systems, reliable technology and stimulates cost control. In turn, in Poland, there are also many enterprises which are based on foreign investments, but also many enterprises like Lasy Państwowe, Katowicki Holding Węglowy, Kompania Węglowa or Tauron, in which problems with management still occur.

Trade and service companies (Group TS) are in similar in many ways. To be sure, sales revenues and the net financial result are higher for Polish Group TS companies, but there are no clear differences as regards ROA, ROE and the share of exports of sales revenues. The reason for higher values of sales revenue and the net financial result for Polish TS is related, in the authors' opinion, to the bigger internal market.

As an effect of cluster analysis we isolated six clusters with the following generalized descriptions: (1) mainly companies in the sector of electric power generation, transmission and distribution, weak in view of economic effectiveness, (2) enterprises of the best economic standing (a high level of ROA, ROS, as well as the productivity of employment). For this group of companies, monitoring the competitive situation and competitive models of business in order to defend their own market position is recommended, (3) a cluster of many companies which are well-known on international markets, with high employment and good economic effectiveness and strategic actions depend here mainly on decisions in central headquarters, while there are constant concerns about the operating rationality and monitoring measures of effectiveness, (4) relatively weak in view of economic effectiveness, but also highly differentiated, including many companies that require restructuring. In this group there is a need for optimization of management of operating costs, fixed assets and working capital, and attention needs to be paid to cash flows that generate the value of their own capital, (5) the weakest cluster in view of economic effectiveness, comprising two companies that require restructuring, wherein a strong need for re-configuration of management systems regarding clients' needs and opening of management to relations with the surrounding environment occurs, (6) a cluster of companies with very good economic effectiveness, operating in mainly traditional branches, an analysis of HR policy to date, as well as optimization within rationality of employment are suggested. There are no clear relations between the composition of a cluster in view of the location of an enterprise in Poland or the Czech Republic, or belonging to Group P or TS and their economic effectiveness. We observe evident prevalence of companies with a stable economic condition over weak companies which are in need of restructuring processes in both Polish and Czech groups.

The structure of both economies can be seen through the prism of the100 largest companies, due to the application of the criterion of division into P and TS not being significantly different. Trade and service companies (Group TS) exist in many different dimensions (ROA, ROE and the share of exports in sales revenues) is similar. The Czech Group P enterprises seem to be, on average, slightly better managed than Polish Group P enterprises.

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Appendix

Table 5 Sales revenues (thousands of Euro)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	190,816	2,292,654	651,183	534,091	261,007	459,793	832,684
TS – Poland	633,532	5,059,439	1,315,660	792,441	832,776	1,019,251	1,611,026
P – Czech	186,071	8,748,666	1,220,443	1,826,869	330,793	439,421	1,195,836
P – Poland	662,978	20,908,289	2,170,419	3,414,230	858,152	952,858	2,008,730

Table 6 Net financial result (thousands of Euro)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	–72,954	609,132	34,633	111,646	734	7,828	18,522
TS – Poland	–123,284	20,217,012	571,210	3,273,692	9,413	29,730	53,669
P – Czech	–302,625	2,344,152	114,755	363,478	12,780	38,270	97,537
P – Poland	–20,434	1,179,925	169,262	277,805	26,849	72,023	144,097

Table 7 Return on sales ratio (%)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	–27.3	5.6	3.2	9.0	0.2	1.6	3.3
TS – Poland	–13.1	15.4	3.5	5.2	1.1	1.6	6.1
P – Czech	–6.4	41.2	10.9	11.4	3.0	6.1	16.6
P – Poland	–0.5	27.3	6.8	6.2	2.4	5.7	9.4

Table 8 Return on assets ratio (%)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	–2.7	32.2	5.9	8.1	0.7	3.3	6.9
TS – Poland	–10.8	21.7	4.9	5.8	2.0	4.2	6.3
P – Czech	–5.6	36.1	9.1	9.4	2.5	6.8	13.9
P – Poland	–1.2	30.3	8.4	7.5	3.4	7.0	11.8

Table 9 Share of exports in sales revenues (%)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	0	78	13	18	2	7	19
TS – Poland	0	92	12	26	0	0	8
P – Czech	0	100	62	35	35	73	94
P – Poland	0	98	48	41	2	70	81

Table 10 Employment

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	37	38,046	4,280	7,703	400	1,880	4,454
TS – Poland	18	39,846	6,967	8,571	1,046	3,863	9,055
P – Czech	115	33,126	4,113	6,450	1,085	2,067	3,981
P – Poland	890	62,103	11,039	14,243	2,907	4,606	12,350

Table 11 Productivity (thousands of Euro)

Specification	Min	Max	Mean	Standard deviation	First quartile	Median	Third quartile
TS – Czech	23	20,311	2,165	4,698	96	272	914
TS – Poland	24	52,308	3,348	9,562	133	251	1,000
P – Czech	76	15,275	1,070	3,179	137	209	573
P – Poland	42	1,049	325	292	139	194	437

Table 12 Profiles of the examined subjects (Group P – Czech Republic)

Name	Profile
AGROFERT HOLDING, a.s.; LESS a.s.; Lesy České republiky, s.p.	Agriculture, hunting and forestry
OKD, a.s.; Severočeské doly a.s.; Sokolovská uhelná, právní nástupce, a.s.	Mining and quarrying
ArcelorMittal Ostrava a.s.; TŘINECKÉ ŽELEZÁRNY, a.s.; Vítkovice Holding a.s.	Manufacture of basic metals and fabricated metal products
ČEPRO, a.s.; ČESKÁ RAFINÉRSKÁ, a.s.; DEZA, a.s.; Linde Gas a.s.; MITAS a.s.; UNIPETROL, a.s.	Manufacture of chemicals and chemical products; manufacture of rubber and plastic products
ABB s.r.o.; Eaton Elektrotechnika s.r.o.; FOXCONN CZ s.r.o.; Panasonic AVC Networks Czech, s.r.o.; WITTE Nejdek, s.r.o.; Daikin Industries Czech Republic s.r.o.	Manufacture of electrical and optical equipment
NOWACO Czech Republic s.r.o.; Philip Morris ČR a.s.; Plzeňský Prazdroj, a.s.	Manufacture of food products and beverages; manufacture of tobacco products
DENSO MANUFACTURING CZECH s.r.o.; Siemens Industrial Turbomachinery s.r.o.; BOSCH Group ČR; SIEMENS Group ČR	Manufacture of machinery and equipment n.e.c.
Automotive Lighting s.r.o.; BOSCH DIESEL s.r.o.; Continental Automotive Systems Czech Republic s.r.o.; Iveco Czech Republic, a.s.; Magna Exteriors & Interiors (Bohemia) s.r.o.; Robert Bosch, s.r.o.; ŠKODA AUTO a.s.; Toyota Peugeot Citroën Automobile Czech, s.r.o.; TRW Automotive Czech s.r.o; Visteon - Autopal, s.r.o.	Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
AGC Flat Glass Czech a.s., člen AGC Group; Saint-Gobain Vertex, a.s.	Manufacture of other non-metallic mineral products
Mondi Štětí a.s.	Manufacture of wood and wood products; manufacture of pulp, paper and paper products; publishing and printing
ALPIQ ENERGY SE; ČEPS, a.s.; ČEZ, a.s.; Dalkia Česká republika, a.s.; Pražská energetika, a.s.; Pražská plynárenská, a.s.; RWE Transgas, a.s.; Veolia Voda Česká republika, a.s.	Electricity

Table 13 Profiles of the examined subjects (TS – Czech Republic)

Name	Profile
eD' system Czech, a.s.; HEWLETT-PACKARD s.r.o.; SWS a.s.	Computer and related activities
EUROVIA CS, a.s.; Metrostav a.s.; OHL ŽS, a.s.; PSG-International a.s.; PSJ, a.s.; Skanska a.s.; ŠKODA PRAHA Invest s.r.o.; STRABAG a.s.	Construction
ČESKÁ TELEVIZE; Fakultní nemocnice Brno; Fakultní nemocnice Hradec Králové; Fakultní nemocnice Plzeň; Všeobecná fakultní nemocnice v Praze	Other community, social and personal service activities
Česká pošta, s.p.; GTS Czech s.r.o.; Telefónica O2 Czech Republic, a.s.; T-Mobile Czech Republic a.s.; Vodafone Czech Republic a.s.	Post and telecommunications
AGEL a.s.	Real estate, renting and business activities
ENI Česká republika, s.r.o.; FORD MOTOR COMPANY, s.r.o.; Import Volkswagen Group s.r.o.; LUKOIL Czech Republic s.r.o.; OMV Česká republika, s.r.o.; Shell Czech Republic a.s.; Slovnaft Česká republika, s.r.o.	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
Advanced World Transport B.V.; ČD Cargo, a.s.; České dráhy, a.s.; Letiště Praha, a.s.; Správa železniční dopravní cesty, státní organizace	Transport, storage and communication
AHOLD Czech Republic, a.s.; ALTA, akciová společnost; AT Computers, a.s.; CARBOUNION BOHEMIA, s.r.o.; COOP Centrum družstvo; DEK a.s.; Ferona, a.s.; GECO TABAK, a.s.; Globus ČR, k.s.; HRUŠKA, s.r.o.; HP TRONIC Zlín, s.r.o.; Lumius, s.r.o.; MAKRO Cash & Carry ČR s.r.o.; METALIMEX a.s.; MORAVIA STEEL a.s.; PHARMOS, a.s.; První novinová společnost a.s.	Wholesale trade and commission trade, except of motor vehicles and motorcycles; Retail trade, except of motor vehicles and motorcycles; repair of personal and house-hold goods

Table 14 Profiles of the examined subjects (Group P-Poland)

Name	Profile
Lasy Państwowe PGL	Agriculture, forestry and fishing
Jastrzębska Spółka Węglowa SA; Katowicki Holding Węglowy SA GK; KGHM Polska Miedź SA GK; Kompania Węglowa SA; PGNiG SA GK	Mining and quarrying
Nestle SA	Manufacture of food products
Grupa Żywiec SA GK; Kompania Piwowarska SA GK	Manufacture of beverages
Grupa Lotos SA GK; Koksownia Przyjaźń Sp. z o.o.; PKN Orlen SA GK	Manufacture of coke and refined petroleum products
Boryszew SA GK; Ciech SA GK	Manufacture of chemicals and chemical products
SHARP Manufacturing Poland; Tele-Fonika Kable SA GK	Manufacture of computer, electronic and optical products
SYNTHOS SA GK	Manufacture of basic metals
BSH Sprzet Gospodarstwa Domowego Sp. z o.o.; Electrolux Poland; Indesit Company Polska; LG Electronics Wrocław Sp. z o.o.; Philips Lighting Poland SA GK; LG Electronics Mława Sp. z o.o.	Manufacture of electrical equipment
Grupa CAN PACK SA; Michelin Polska SA	Manufacture of fabricated metal products, except machinery and equipment
Fiat Auto Poland SA; Fiat GM Powertrain Polska Sp. z o.o.; Grupa Magneti Marelli; Grupa Valeo Polska; TRW Polska; Volkswagen Motor Sp. z o.o.; VOLKSWAGEN Poznań Sp. z o.o.	Manufacture of motor vehicles, trailers and semi-trailers
Grupa Saint-Gobain	Manufacture of other non-metallic mineral products
Philip Morris Polska SA	Manufacture of tobacco products
Swedwood Poland SA	Manufacture of wood and of products of wood and cork, except furniture
PGE Polska Grupa Energetyczna SA GK; TAURON Polska Energia SA GK; ENERGA SA GK	Electricity

Table 15 Profiles of the examined subjects (Group TS – Poland)

Name	Profile
Totalizator Sportowy	Arts, entertainment and recreation
BUDIMEX SA GK; Grupa Skanska SA; Mostostal Warszawa SA GK; POLIMEX-MOSTOSTAL SA GK; STRABAG Polska Sp. z o.o.	Construction
Alpiq Energy SE; ENEA SA GK; Energa-Obrót SA; ENERGA Operator SA; EVEREN Sp z o.o.; PKP Energetyka SA; PSE-Operator SA; RWE Polska; Vattenfall Energy Traiding Sp z o.o.	Electricity, gas, steam and air conditioning supply
ASSECO Poland SA GK; GETIN Holding SA GK; PKT Centertel Sp z o.o.; Polkomtel SA; Polska Telefonia Cyfrowa Sp z o.o.	Information and communication
Glaxosmithkline Pharmaceuticals SA GK	Pharmaceutical products
Emperia Holding SA GK; PGB SA GK	Professional, scientific and technical activities
Grupa PKP SA; Jeronimo Martins; PKP Cargo SA; PKP Polskie Linie Kolejowe SA; Polskie Linie Lotnicze LOT SA; PPUP Poczta Polska	Transportation and storage
AB SA GK ; abc Data SA GK; Animex Sp z o.o.; Auchan Polska Sp z o.o.; BP Europa SE Polska SA; British American Tobacco Polska TRAIDING Sp z o.o.; Carrefour Polska; Castorama Polska Sp z o.o.; Eurocash SA GK; Farmacol SA GK; Grupa Metro W Polsce; Grupa Muszkieterów; Grupa Polomarket; Grupa Shell Polska; Grupa Statoil Polska; Grupa Unilever; KGHM Metraco SA; Kolpolter SA; LIDL Polska Sp z o.o.; Makro Cash And Carry Polska SA; Media-Saturn Holding Polska Sp. z o.o.; NEUCA SA; Orlen Petrocentrum Sp. z o.o.; Polska Grupa Farmaceutyczna SA GK; Polski Koks SA; PPHU Specjał GK; PSH Lewiatan; REAL Sp z o.o.; ROSSMAN SDD Sp z o.o.; RUCH SA; Samsung Electronics Polska Sp. z o.o.; SELGROS Sp. z o.o.; Węglokoks SA	Wholesale and retail trade; repair of motor vehicles and motorcycles